

## ABSTRACT

Devices and systems including a heat spreader with possibly controlled thermal expansion. For example, an integral heat spreader may include an insert formed of a high thermal conductivity material with a first coefficient of thermal expansion, and a ring formed of a stiff material with a second coefficient of thermal expansion, wherein the second coefficient of thermal expansion is smaller or significantly smaller than the first coefficient of thermal expansion. An integral heat spreader may optionally include, for example, a plating, a coating, or a patch, and may be included, for example, in a semiconductor device.